The documentation process conversion measures necessary to comply with this revision shall be completed by 20 March 1998

INCH-POUND

MIL-PRF-19500/535B
20 December 1997
SUPERSEDING
MIL-S-19500/535A(USAF)
28 January 1994

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, POWER
TYPES 2N5003, 2N5005, JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the performance requirements for PNP, silicon, power transistors for use in high-speed power-switching applications. Four levels of product assurance are provided for each device type as specified in MIL-PRF-19500. Two levels of product assurance are provided for unencapsulated die.

1.2 Physical dimensions. See figure 1 (T6-C, similar to T0-59) and figure 2 (JANHC and JANKC).

1.3 Maximum ratings.

P_T 1/ T_A = +25°C	P_T 2/ T_C = +25°C	V_{CBO}	V_{CEO}	V_{EBO}	I_C	I_C 3/	Reverse pulse 4/ energy	T_{stg} and T_J
W	W	V dc	V dc	V dc	A dc	A dc	mJ	°C
2	58	100	80	5.5	5	10	15	-65 to +200

1/ Derate linearly 11.4 mW/°C for T_A > +25°C
2/ Derate linearly 331 mW/°C for T_C > +25°C
3/ This value applies for $P_W \leq 8.3$ ms, duty cycle ≤ 1 percent.
4/ This rating is based on the capability of the transistors to operate safely in the unclamped inductive load energy test circuit of figure 4.

1.4. Primary electrical characteristics at T_C = +25°C.

Limits	h_{FE2} 1/ V_{CE} = 5 V I_C= 2.5A		$\|h_{fe}\|$ V_{CE} = 5 V I_C = 500 mA dc f = 10 MHz		$V_{BE(sat)2}$ 1/ I_C = 5 A dc I_B = 500 mA dc	$V_{CE(Sat)2}$ 1/ I_C = 5 A dc I_B = 500 mA dc	C_{obo} V_{CB} = 10 V dc I_E = 0 f = 1 MHz	$R_{\theta JA}$	$R_{\theta JC}$
	2N5003	2N5005	2N5003	2N5005					
					V dc	V dc	pF	°C/W	°C/W
Min	30	70	6	7					
Max	90	200			2.2	1.5	250	88	3

1/ Pulsed (see 4.5.1)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAT, 3990 East Broad Street, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

2. APPLICABLE DOCUMENTS

2.1. General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2. Government documents.

2.2.1. Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARD

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3. Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications or specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1. Qualification. Devices furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2. Associated detail specification. The individual item requirements shall be in accordance with MIL-PRF-19500, and as specified herein.

3.3. Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

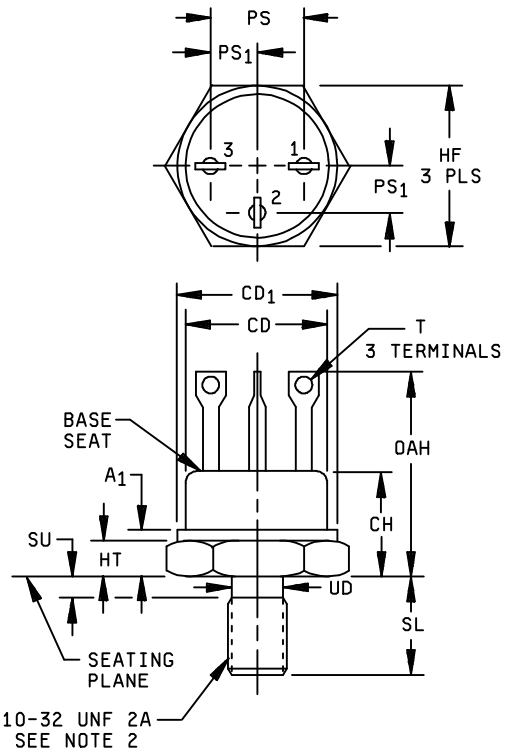
3.4. Interface requirements and physical dimensions. The Interface requirements and physical dimensions shall be as specified on figure 1 (T6-C) (T0-59) and figure 2 (JANHC and JANKC) herein.

3.4.1. Lead finish. Unless otherwise specified, lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein.

3.4.2. Current density. Current density of internal conductors shall be as specified in MIL-PRF-19500.

3.4.3. Construction. These devices shall be constructed in a manner and using materials which enable tha transistors to meet the applicable requirements of MIL-PRF-19500 and this document.

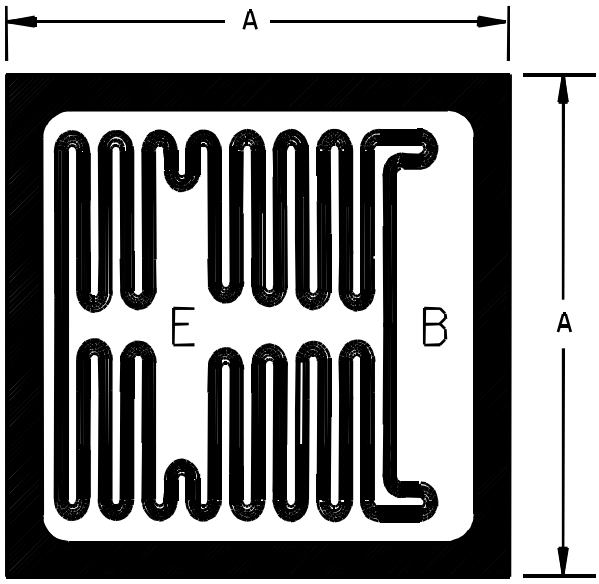
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A	- - -	.250	- - -	6.35	
CD	.330	.360	8.38	9.14	
CD	.370	.437	9.40	11.10	
CH	.320	.468	8.13	11.80	
HF	.424	.437	10.77	11.10	
HT	.090	.150	2.67	3.81	
OAH	.575	.763	14.61	19.40	5
PS	.185	.215	4.70	5.46	4, 8
PS	.090	.110	2.29	2.79	4, 8
SL	.400	.455	10.16	11.56	
SU	- - -	.078	- - -	1.98	7
T	.040	.065	1.02	1.65	
UD	.155	.189	3.94	4.80	



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. See FED-STD-H28, “Screw-Thread Standards for Federal Services”.
4. The orientation of the terminals in relation to the hex flats is not controlled.
5. All three terminals.
6. The case temperature may be measured anywhere on the seating plane within .125 (3.18 mm) of the stud.
7. Terminal spacing measured at the base seat only.
8. This dimension applies to the location of the center line of the terminals.
9. Terminal - 1, emitter; terminal - 2, base; terminal - 3, collector. Collector lead is isolated from the case.

FIGURE 1. Physical dimensions of transistor types (JAN, JANTX, and JANTXV) 2N5003and 2N5005 (T0-59).



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.117	.127	2.97	3.23

NOTES:
1. Dimensions are in inches.
2. Metric equivalents (millimeters) are in parenthesis.
3. Metric equivalents are given for general information only.
4. Unless otherwise specified, tolerance is ± .005 (0.13 mm).
5. The physical characteristics of the die are;
   Thickness: .008 (0.20 mm) to .012 (0.30 mm), tolerance is ± .005 (0.13 mm).
   Top metal: Aluminum, 40,000 Å minimum, 50,000 Å nominal.
   Back metal: Gold 2,500 Å minimum, 3,000 Å nominal.
   Back side: Collector.
   Bonding pad: B = .015 (0.38 mm) x .0072 (.183).
   E = .015 (0.38 mm) x .0060 (.152).

Inches	mm
.005	0.13
.006	0.15
.0072	0.183
.008	0.20
.012	0.30
.015	0.38
.117	2.97
.127	3.23

FIGURE 2. Physical dimensions JANHCA and JANKCA die dimensions.

3.5. Marking. Devices shall be in accordance with MIL-PRF-19500.

3.6. Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4 and table I herein.

3.7. Electrical test requirements. The electrical test requirements shall be the subgroups specified in 4.4.2 and 4.4.3 herein.

4. VERIFICATION

4.1. Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.2).

b. Screening (see 4.3)

c. Conformance inspection (see 4.4).

4.2. Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500.

4.2.1. JANHC and JANKC devices. Qualification for JANHC and JANKC devices shall be in accordance with appendix G of MIL-PRF-19500.

4.3. Screening (JANS, JANTX, and JANTXV levels only). Screening shall be in accordance with MIL-PRF-19500 (Appendix E, table IV), and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see appendix E, table IV of MIL-PRF-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
1/	Thermal impedance (see 4.3.2)	Thermal impedance (see 4.3.2)
9	I_{CES1} and h_{FE2}	Not applicable
11	ΔI_{CES1} = 100 percent or 100 nA, whichever is greater; $\Delta h_{FE2} = \pm$ 20 percent.	I_{CES1} and h_{FE2}
12	See 4.3.1	See 4.3.1
13	Subgroups 2 and 3 of table I herein: ΔI_{CES1} = +100 percent of initial value or 100 nA, whichever is greater $\Delta h_{FE2} = \pm$ 20 percent.	Subgroup 2 of table I herein: ΔI_{CES1} = +100 percent of initial value or 100 nA, whichever is greater $\Delta h_{FE2} = \pm$ 20 percent.

1/ May be performed anytime before screen 9.

4.3.1. Power burn-in conditions. Power burn-in conditions are as follows: T_A = Room ambient as defined in the general requirements of MIL-STD-750, (see 4.5); V_{CE} = 40 V $\pm$ 1 V, P_T = 2.0 W (min)

NOTE: No heat sink or forced air cooling on the device shall be permitted

4.3.2. Thermal impedance ($Z_{\theta JX}$ measurements). The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3131. The maximum limit (not to exceed the group A, subgroup 2 limit) for $Z_{\theta JX}$ in screening (appendix E, table IV of MIL-PRF-19500) shall be derived by each vendor by means of statistical process control. When the process has exhibited control and capability, the capability data shall be used to establish the fixed screening limit. In addition to screening, once a fixed limit has been established, monitor all future sealing lots using a random five piece sample from each lot to be plotted on the applicable X, R chart. If a lot exhibits an out of control condition, the entire lot shall be removed from the line and held for Engineering evaluation and disposition.

4.3.2.1. Thermal impedance ($Z_{\theta JX}$ measurements) for initial qualification or requalification.
The $Z_{\theta JX}$ measurements shall be performed in accordance with MIL-STD-750, method 3131 (read and record date $Z_{\theta JX}$). $Z_{\theta JX}$ shall be supplied on one lot (500 devices minimum and a thermal response curve shall be submitted). Twenty-two of these samples shall be serialized and provided to the qualifying activity for correlation prior to shipment of parts. Measurements conditions shall be in accordance with 4.4.1 herein.

4.3.3. Screening (JANHC or JANKC). Screening of die shall be in accordance with MIL-PRF-19500, appendix G. As a minimum, die shall be 100-percent probed to ensure compliance with group A, subgroup 2.

4.4. Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500.

4.4.1. Group A inspection. Group A inspection shall be conducted in accordance with appendix E, table V of MIL-PRF-19500 and table I herein. End-point electrical measurements shall be in accordance with the applicable steps of table II herein. The following test conditions shall be used for $Z_{\theta JX}$, end-point measurements:
$Z_{\theta JX}$ = 3.1°C/W.

a. I_M ..... 10 mA.

b. V_{CE} measurement voltage ..... 20 V (same as V_H).

c. I_H collector heating current ..... 1 A (minimum).

d. V_H collector-emitter heating voltage. 20 V (minimum).

e. t_H heating time ..... 100 ms.

f. t_{MD} measurement delay time ..... 50 µs to 80 µs.

g. t_{SW} sample window time ..... 10 µs (maximum).

4.4.2. Group B inspection. Group B inspection shall be conducted in accordance with conditions specified for the subgroup testing in appendix E, table VIa (JANS) and table VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500, and as follows. Electrical measurements (end points) and delta requirements shall be in accordance with the applicable steps of table II herein.

4.4.2.1. Group B inspection, appendix E, table VIa (JANS) of MIL-PRF-19500.

Subgroup	Method	Condition
B4	1037	V_{CB} = 10 V dc minimum, P_T = 2.5 W minimum, T_A = +25°C ± 3°C.
B5	1027	V_{CB} = 20 V dc, T_J = +275°C ± 5°C for 96 hours; Adjust the chosen T_A and P_T to give an average lot T_J = +275°C. Marking legibility requirements shall not apply.
B6	3131	See 4.5.2.

4.4.2.2. Group B inspection, appendix E, table VIb (JANTX and JANTXV) of MIL-PRF-19500.

Subgroup	Method	Condition
B3	1037	V_{CB} = 10 V dc minimum, P_T = 2.5 W minimum, T_A = +25°C ± 3°C.
B5	3131	See 4.5.2.

4.4.3. Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table VII of MIL-PRF-19500 and as follows. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table II herein.

Subgroup	Method	Conditions
C2	2036	Test condition A, weight = 7 pounds, ± 5 ounces, application time = 15 seconds; Test condition D1, torque = 6 inch - ounce, application time = 15 seconds; test condition D2, torque = 15 in - lbs, application time = 15 seconds.
C6	1037	V_{CB} = 10 V dc minimum, P_T = 2.5 W minimum, T_A = +25°C ± 3°C.

4.5. Methods of examination and test. Methods of examination and test shall be as specified in the appropriate tables and as follows.

4.5.1. Pulse measurements. Conditions for pulse measurements shall be as specified in section 4 of MIL-STD-750.

4.5.2. Thermal resistance. Thermal resistance measurements shall be conducted in accordance with method 3131 of MIL-STD-750. The following details shall apply:

a. Collector current magnitude during power application shall be 2.0 A dc.

b. Collector to emitter voltage magnitude shall be 10 V dc.

c. Reference temperature measuring point shall be the case.

d. Reference point temperature shall be +25°C ≤ T_R ≤ +75°C and recorded before the test is started.

e. Mounting arrangement shall be with heat sink to case.

f. Maximum limit of $R_{\theta JC}$ shall be 3.0°C/W.

4.5.3. Inspection conditions. Unless otherwise specified herein all inspections shall be conducted at a case temperature (T_C) of +25°C.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Thermal impedance	3131	See 4.4.1			3.1	°C/W
Breakdown voltage, collector to emitter	3011	Bias condition D, I_C = 100 mA dc, I_B = 0, pulsed (see4.5.1)	$V_{BR(CEO)}$	80		V dc
Collector to emitter cutoff current	3041	Bias condition C, V_{CE} = 60 V dc, V_{BE} = 0	I_{CES1}		1.0	µA dc
Collector to emitter cutoff current	3041	Bias condition C, V_{CE} = 100 V dc, V_{BE} = 0	I_{CES2}		1.0	µA dc
Collector to emitter cutoff current	3041	Bias condition D, V_{CE} = 40 V dc, I_B = 0	I_{CEO}		1.0	Ma dc
Emitter to base cutoff current	3061	Bias condition D, V_{EB} = 4 V dc, I_C = 0	I_{EBO1}		50	µA dc
Emitter to base cutoff current	3061	Bias condition D, V_{EB} = 5.5 V dc, I_C = 0	I_{EBO2}		1.0	µA dc
Forward - current transfer ratio	3076	V_{CE} = 5 V dc, I_C = 5 A dc, pulsed (see 4.5.1)	h_{FE1}		1.0	mA dc
Forward - current transfer ratio	3076	V_{CE} = 5 V dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	h_{FE2}			
2N5003				20		
2N5005				50		
Forward - current transfer ratio	3076	V_{CE} = 5 V dc, I_C = 5 A dc, pulsed (see 4.5.1)	h_{FE3}			
2N5003				30	90	
2N5005				70	200	
Forward - current transfer ratio	3076					
2N5003				20		
2N5005				40		

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 2 - Continued						
Base-emitter voltage (nonsaturated)	3066	Test condition B, V_{CE} = 5 V dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	V_{BE}		1.45	V dc
Base-emitter saturation voltage	3066	Test condition A, I_C = 2.5 A dc, I_B = 250 mA dc, pulsed (see 4.5.1)	$V_{BE(sat1)}$		1.45	V dc
Base-emitter saturation voltage	3066	Test condition A, I_C = 5 A dc I_B = 500 mA dc, pulsed (see 4.5.1)	$V_{BE(sat2)}$		2.2	V dc
Collector-emitter saturation voltage	3071	I_C = 2.5 A dc, I_B = 250 mA dc, pulsed (see 4.5.1)	$V_{CE(sat1)}$		0.75	V dc
Collector-emitter saturation voltage	3071	I_C = 5 A dc, V_{CE} = 40 V dc, pulsed (see 4.5.1)	$V_{CE(sat2)}$		1.5	V dc
Subgroup 3						
High-temperature operation:		T_C = +150°C				
Collector to emitter cutoff current	3041	Bias condition A; V_{CE} = 60 V dc, V_{BE} = +2 V dc	I_{CEX}		500	µA dc
Low-temperature operation:		T_C = -65°C				
Forward-current transfer ratio	3076	V_{CE} = 5 V dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	h_{FE4}			
2N5003				15		
2N5005				25		
Subgroup 4						
Common-emitter, small-signal, short-circuit, forward-current transfer ratio	3206	V_{CE} = 5 V dc, I_C = 100 mA dc, f = 1 kHz	h_{fe}			
2N5003				20		
2N5005				50		

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 4 - Continued						
Magnitude of common-emitter, small-signal short-circuit, forward-current transfer ratio	3206	V_{CE} = 5 V dc, I_C = 500 mA dc f = 10 MHz	h_{fe}			
2N5003				6		
2N5005				7		
Open-circuit output capacitance	3236	V_{CB} = 10 V dc, I_E = 0, f = 1 MHz	C_{obo}		250	pF
Switching time		I_C = 5 A dc, I_{B1} = 500 mA dc	t_{on}		0.5	µs
		I_{B2} = -500 mA dc	t_s		1.4	µs
		$V_{BE(off)}$ = 3.7 V	t_f		0.5	µs
		R_L = 6Ω,(See figure 5)	t_{off}		1.5	µs
Subgroup 5						
Safe operating area (dc)	3055	Pre-pulse condition for each test:				
		V_{CE} = 0, I_C = 0, T_C = +25°C				
		Pulse condition for each test t_p = 1 sec. 1 cycle				
		T_C = +25°C, (See figure 3)				
Test #1		V_{CE} = 12 V dc, I_C = 5 A dc				
Test #2		V_{CE} = 32 V dc, I_C = 1.7 A dc				
Test #3		V_{CE} = 80 V dc, I_C = 100 mA dc				
Safe operating area (unclamped inductive)		T_C = +25°C, R_{BB1} = 10Ω R_{BB2} = 100Ω, L = 0.3 mH, RL = 0.1Ω, V_{CC} = 10 V dc V_{BB1} = 10 V dc, V_{BB2} = 4 V dc I_{CM} = 10 A dc (See figure 4)				
End-point electrical measurements		See table II, steps 1, 2, and 3				
Subgroups 6 and 7						
Not applicable						

1/ For sampling plan, see MIL-PRF-19500

TABLE II. Groups A, B, and C electrical measurements. 3/ 4/ 5/

Steps	Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Collector to emitter cutoff current	3041	V_{CE} = 60 V dc Condition C, V_{BE} = 0	I_{CES1}		1.0	µA dc
2.	Forward-current transfer ratio	3076	V_{CE} = 5 V dc I_C = 2.5 A dc pulsed (see 4.5.1)	h_{FE2}			
	2N5003 2N5005				30 70	90 200	
3.	Breakdown voltage collector to emitter	3011	Bias condition A, I_C = 100 mA dc I_B = 0, pulsed (see 4.5.1)	$V_{(BR)CEO}$	80		V dc
4.	Collector to emitter cutoff current	3041	V_{CE} = 60 V dc	I_{CES1} 2/	100 percent of initial value or 100 nA, whichever is greater.		
5.	Forward-current transfer ratio	3076	I_C = 2.5 V dc, V_{CE} = 5 V dc pulsed (see 4.5.1)	Δh_{FE2} 2/	± 20 percent change from initial reading.		
6.	Base to emitter saturation voltage	3066	Test condition A, I_C = 2.5 A dc I_B = 250 mA dc pulsed (see 4.5.1)	$V_{BE(sat)}$		1.45	V dc

1/ See MIL-PRF-19500 for sampling plan.
2/ Devices which exceed the group A limits for this test shall not be accepted.
3/ The electrical measurements for appendix E, table VIa (JANS) of MIL-PRF-19500 are as follows:

a. Subgroup 3, see table II herein, steps 1, 2, and 6.

b. Subgroup 4, see table II herein, steps 2, 3, 4, 5, and 6.

c. Subgroup 4, see table II herein, steps 2, 3, 4, 5, and 6.

4/ The electrical measurements for appendix E, table VIb (JANTX and JANTXV) of MIL-PRF-19500 are as follows:

a. Subgroup 2, see table II herein, steps 1, 2, and 3.

b. Subgroup 3, see table II herein, steps 1, 2, 4, and 5.

c. Subgroup 6, see table II herein, steps 1, 2, 4, and 5.

5/ The electrical measurements for appendix E, table V of MIL-PRF-19500 are as follows:

a. Subgroup 2, see table II herein, steps 1, 2, and 3.

b. Subgroup 3, see table II herein, steps 1, 2, and 3.

c. Subgroup 6, see table II herein, steps 1, 2, 4, and 5.

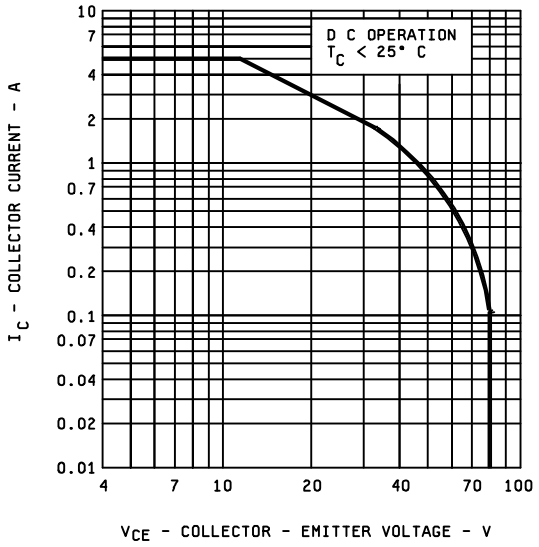
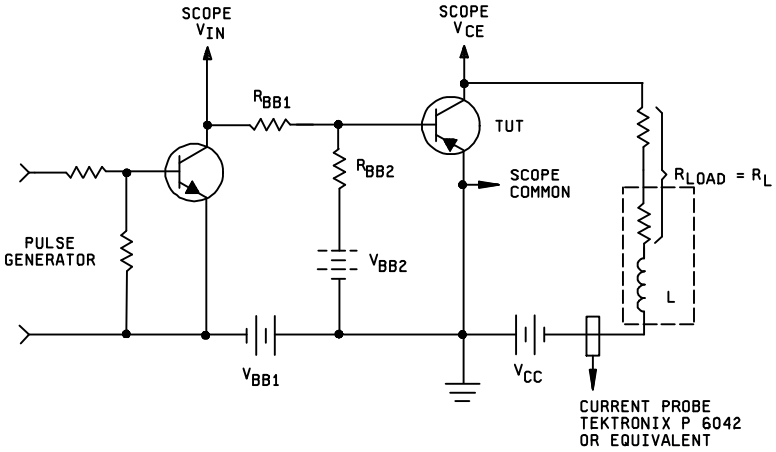
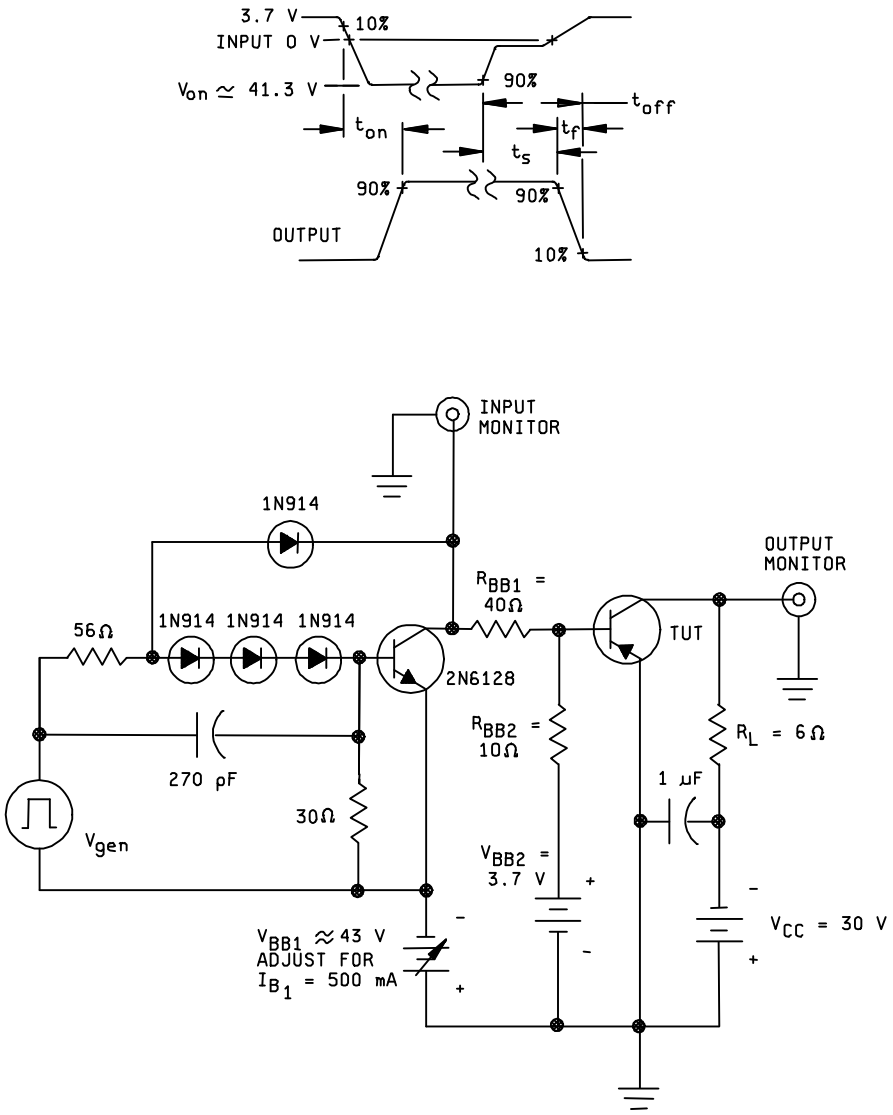


FIGURE 3. Maximum safe operating area.



R_{BB1} = 10Ω
R_{BB2} = 100Ω
L = 0.3 mH
R_L = 0.1Ω
V_{CC} = 10 V dc
I_C = 10 A
V_{BB1} = 10 V dc
V_{BB2} = 4 V dc

FIGURE 4. Unclamped inductive load energy test circuit.



NOTES:

1. V_{gen} is -30 pulse (from 0 V) into a 50 ohm termination.
2. The V_{gen} waveform is supplied by a generator with the following characteristics: $t_r \leq 15$ ns, $t_f = 15$ ns, $Z_{out} = 50$ ohm, duty cycle ≤ 2 percent.
3. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 1$ ns, $R_{IN} \geq 10$ MΩ, $C_{IN} \leq 11.5$ pF.
4. Resistors shall be noninductive types.
5. The dc power supplies may require additional bypassing in order to minimize ringing.
6. An equivalent drive circuit may be used.

FIGURE 5. Switching time test circuit.

5. PACKAGING

5.1. Packaging. Packaging shall prevent mechanical damage of the devices during shipping and handling and shall not be detrimental to the device. When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Points' packaging activity within the Military Department or Defense Agency, or within the Military Departments' System Command. Packaging data retrieval is available from the managing Military Departments' or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2. Marking. Unless otherwise specified (see 6.2), marking shall be in accordance with MIL-STD-129.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1. Notes. The notes specified in MIL-PRF-19500 are applicable to this specification.

6.2. Acquisition requirements. See MIL- PRF-19500.

6.3. Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No.19500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Supply Center Columbus, ATTN: DSCC-VQE, Post Office Box 3990, Columbus, OH 43216-5000.

6.4. Interchangeability information. The 2N5003 and 2N5005 (MIL-PRF-19500/535) are inactive for new design. For new design use 2N7372 (MIL-PRF-19500/612). MIL-PRF-19500/612 is a T0-254 package version of MIL-PRF-19500/535, which is a T0-210 (T0-59) package version. The military 2N7372 contains the same die as the military 2N5003 and 2N5005.

6.5. Suppliers of JANHC die. The qualified JANHC die suppliers with the applicable letter version (example JANHCA2N5003) will be identified on the QPL.

JANHC ordering information	
PIN	Manufacturer CAGE
	33178
2N5003 2N5005	JANHCA2N5003 JANHCA2N5005
2N5003 2N5005	JANKCA2N5003 JANKCA2N5005

6.6. Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIAL

Custodians:
Air Force - 17
NASA - NA

Review activities:
Air Force - 19, 85, 99

Preparing activity:
DLA - CC

(Project 5961 - F149)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-PRF-19500/535B	**2. DOCUMENT DATE** 20 December 1997

3. DOCUMENT TITLE SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, POWER TYPES 2N5003, 2N5005, JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) Commercial DSN FAX EMAIL	7. DATE SUBMITTED

8. PREPARING ACTIVITY

a. Point of Contact Alan Barone	b. TELEPHONE Commercial: (614)692-0510 DSN: 850-0510 FAX: (614)692-6939 EMAIL: alan_barone@dscc.dla.mil
c. ADDRESS Defense Supply Center Columbus, ATTN: DSCC-VAT, 3990 East Broad Street, Columbus, OH 43216-5000	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340

DD Form 1426, OCT 89 Previous editions are obsolete 198/290